

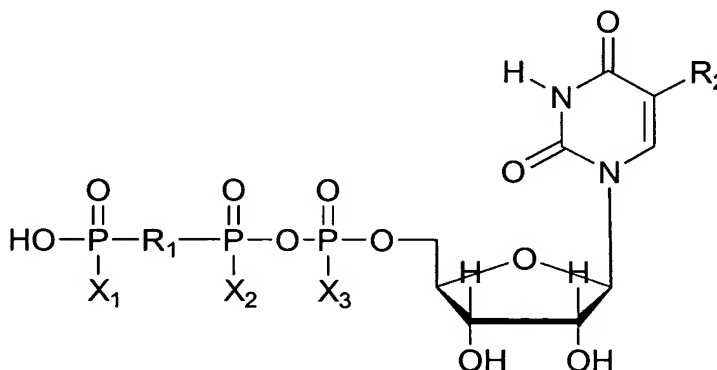
**WHAT IS CLAIMED IS:**

1. A method of stimulating tear secretion and mucin production in eyes  
5 comprising the step of administering to the eyes an effective amount of a preparation  
which includes a compound selected from a group consisting of uridine 5'-triphosphate  
and derivatives as depicted in Formula I, dinucleotides as depicted in Formulae II, II(a)  
and II(b), adenosine 5'-triphosphate derivatives as depicted in Formula III, and cytidine  
5'-triphosphate derivatives as depicted in Formula IV, and their pharmaceutically  
10 acceptable salts; and

a physiologically compatible vehicle selected from the group consisting of  
aqueous electrolyte solutions, polyethers, polyvinyls, polymers of acrylic acid, lanolin,  
and glucosaminoglycans;

whereby said preparation promotes tear secretion and mucin production in  
15 the eyes in a subject in need of such treatment:

**FORMULA I**



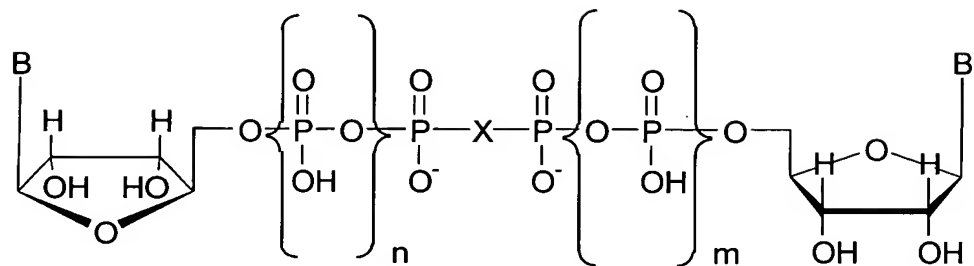
wherein:

X<sub>1</sub>, X<sub>2</sub> and X<sub>3</sub> are each independently either O<sup>-</sup> or S;

R<sub>1</sub> is O, imido, methylene or dihalomethylene;

R<sub>2</sub> is H or Br;

## FORMULA II



wherein:

X is oxygen, imido, methylene or difluoromethylene;

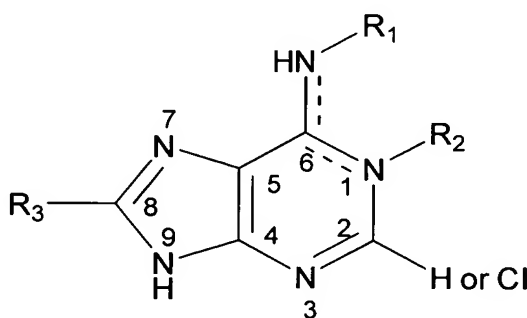
n = 0 or 1;

m = 0 or 1;

n + m = 0, 1 or 2; and

B and B' are each independently a purine residue, as in Formula IIa, or a pyrimidine residue, as in Formula IIb, linked through the 9- or 1-position, respectively:

### FORMULA IIa



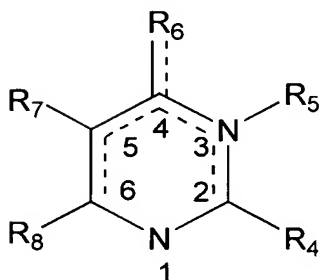
wherein:

R<sub>3</sub> is NHR<sub>1</sub>;

R<sub>1</sub> of the 6- or 8-HNR<sub>1</sub> groups is chosen from the group consisting of hydrogen, arylalkyl (C<sub>1-6</sub>) groups; and alkyl groups with functional groups selected from the group consisting of ([6-aminoethyl]carbamoylmethyl)-, ω-acylated-amino(hydroxy, thiol or carboxy)alkyl(C<sub>2-10</sub>)- and ω-acylated-amino (hydroxy, thiol or carboxy) derivatives where

the acyl group is chosen from the group consisting of acetyl, trifluoroacetyl, benzoyl, and substituted-benzoyl;

**FORMULA IIb**



wherein:

R<sub>4</sub> is hydroxy, mercapto, amino, cyano, aralkoxy, C<sub>1-6</sub> alkoxy, C<sub>1-6</sub> alkylamino or dialkylamino, with the alkyl groups optionally linked to form a heterocycle;

R<sub>5</sub> is hydrogen, acyl, C<sub>1-6</sub> alkyl, aroyl, C<sub>1-5</sub> alkanoyl, benzoyl, or sulphonate;

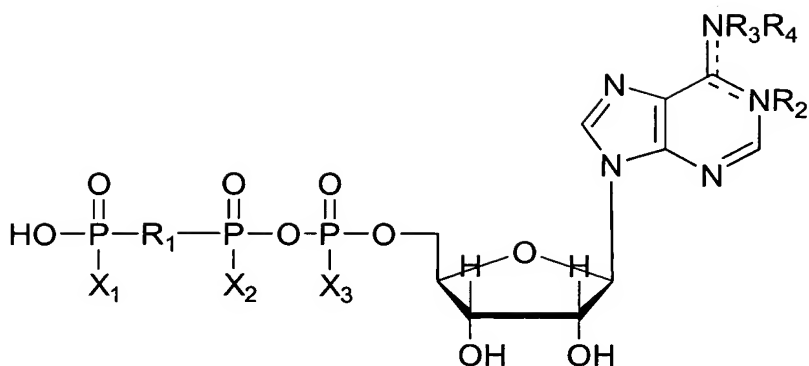
R<sub>6</sub> is hydroxy, mercapto, alkoxy, aralkoxy, C<sub>1-6</sub>-alkylthio, C<sub>1-5</sub> disubstituted amino, triazolyl, alkylamino or dialkylamino, where the alkyl groups are optionally linked to form a heterocycle or linked to N<sup>3</sup> to form an optionally substituted ring;

R<sub>7</sub> is hydrogen, hydroxy, cyano, nitro, alkenyl with the alkenyl moiety optionally linked through oxygen to form a ring optionally substituted on the carbon adjacent to the oxygen with alkyl or aryl groups, substituted alkynyl, halogen, alkyl, substituted alkyl, perhalomethyl, C<sub>2-6</sub> alkyl, C<sub>2-3</sub> alkenyl, or substituted ethenyl, C<sub>2-3</sub> alkynyl or substituted alkynyl;

or together R<sub>6</sub> – R<sub>7</sub> form a 5 or 6-membered saturated or unsaturated ring bonded through N or O at R<sub>6</sub>, such a ring optionally contains substituents that themselves contain functionalities; provided that when R<sub>8</sub> is amino or substituted amino, R<sub>7</sub> is hydrogen; and

R<sub>8</sub> is hydrogen, alkoxy, arylalkoxy, alkylthio, arylalkylthio, carboxamidomethyl, carboxymethyl, methoxy, methylthio, phenoxy or phenylthio;

# FORMULA III



wherein:

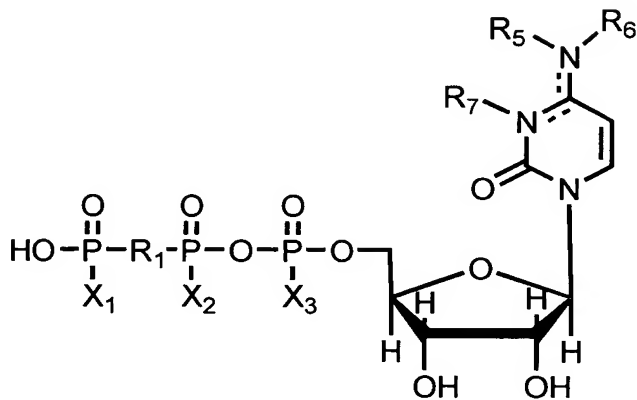
R<sub>1</sub>, X<sub>1</sub>, X<sub>2</sub> and X<sub>3</sub> are defined as in Formula I;

R<sub>3</sub> and R<sub>4</sub> are H while R<sub>2</sub> is nothing and there is a double bond between N-1 and C-6, or

R<sub>3</sub> and R<sub>4</sub> are H while R<sub>2</sub> is O and there is a double bond between N-1 and C-6, or

R<sub>3</sub>, R<sub>4</sub> and R<sub>2</sub> taken together are -CH=CH-, forming a ring from N-6 to N-1 with a double bond between N-6 and C-6;

# FORMULA IV



wherein:

R<sub>1</sub>, X<sub>1</sub>, X<sub>2</sub> and X<sub>3</sub> are defined as in Formula I;

R<sub>5</sub> and R<sub>6</sub> are H while R<sub>7</sub> is nothing and there is a double bond between N-3 and C-4, or

R<sub>5</sub>, R<sub>6</sub> and R<sub>7</sub> taken together are -CH=CH-, forming a ring from N-3 to N-4 with a double bond between N-4 and C-4 optionally substituted at the 4- or 5-position of the etheno ring.

2. A method according to Claim 1, wherein said administration involves topical administration of said compound via a carrier vehicle selected from a group consisting of drops of liquid, liquid wash, gels, ointments, sprays and liposomes.

3. A method according to Claim 2, wherein said topical administration comprises infusion of said compound to said ocular surface via a device selected from a group consisting of a pump-catheter system, a continuous or selective release device, and a contact lens.

4. A method according to Claim 1, wherein said administration involves systemic administration of said compound by administering a liquid/liquid suspension of said compound via nose drops or nasal spray or nebulized liquid to oral or nasopharyngeal airways of said subject, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

5. A method according to claim 1, wherein said systemic administration of said compound is accomplished by administering an oral form of said compound, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

6. A method according to claim 4, wherein said systemic administration of said compound is accomplished by administering an injectable form of said compound, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

7. A method according to claim 4, wherein said systemic administration of said compound is accomplished by administering a suppository form of said compound,

such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

8. A method according to claim 4, wherein said systemic administration of said compound is accomplished by administering an intra-operative instillation of a gel, cream, powder, foam, crystals, liposomes, spray or liquid suspension form of said compound, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

9. A method according to Claim 1, wherein said compound is administered in an amount sufficient to achieve concentrations thereof on the ocular surfaces of said subject of from about  $10^{-7}$  to about  $10^{-1}$  moles/liter.

10. A method of stimulating tear secretion and mucin production in eyes comprising the step of administering to the eyes an effective amount of  $P^1$ ,  $P^4$ -di(uridine-5')-tetraphosphate.

11. A method of treating dry eye diseases comprising the step of administering to the eyes an effective amount of  $P^1$ ,  $P^4$ -di(uridine-5')-tetraphosphate.

12. A method of treating corneal injury comprising the step of administering to the eyes an effective amount of  $P^1$ ,  $P^4$ -di(uridine-5')-tetraphosphate.